

Carbohydrates:

A-preparations

The separation of carbohydrates from other plant components is generally carried out using some kind of extraction or clean-up steps :

A- **Extraction of monosaccharide's** : **one part** of the fresh plants materials is homogenized and mixed with **4 parts of distilled water for about 15 min** and then followed by filtration. After filtration the filtrate is concentrated to a bout ten times at vacuum and allowed to crystalized in refrigerator

B- **Extraction of oligosaccharides** : **one part** of the fresh plants materials is homogenized and mixed with **6-8 parts of distilled water at 90 C for about 15 min** and then filter the solution with celite while hot and after filtration the filtrate is concentrated to a bout ten times at vacuum and allowed to crystalized in refrigerator

C- Extraction of polysaccharides :

a- the plant material is treated with **ethanol** . The filtered residue is collected and treated with a mixture of **ether and benzoic acid**. Then filtered and collected and treated with **1% NaCl** solution and filtered and collect . alkalization of the last filtrate is occurred by **0.5% of ammonium oxalate**

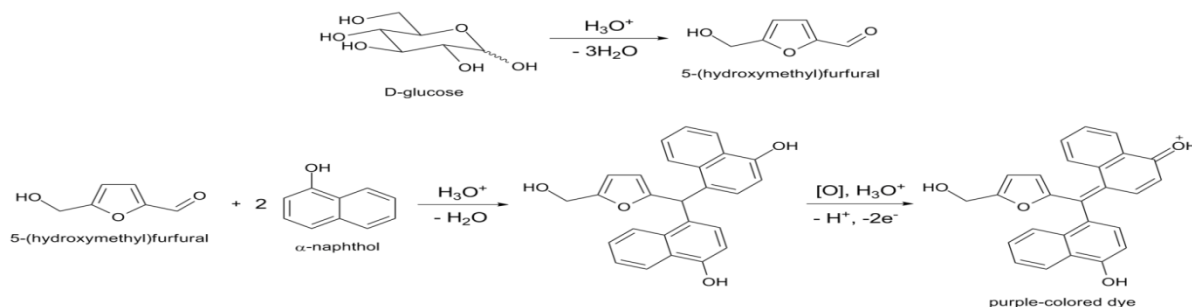
b- the final product is treated with **1% NaCl at 70 c** for about 1 hour and filtration again.

c- The filtrate is treated with **7-12% NaOH for 24** hour and the filtrate is exposed to **acidification** by HCL

d- finally the purified is **precipitate with ethanol**.

B-Identification:

A- Molisch test: The mixture is dehydrated by mixing with H_2SO_4 or HCl to produce aldehyde and then condense with naphthol at which a purple colored ring will be produced in the container



B- Fehling solution : It is generally used for reducing sugars and composed of two solutions, which are mixed together. Fehling solution A composed of 0.5% of **copper sulphate** whereas Fehling solution B composed of **Sodium-Potassium Tartarate**. the carbohydrate will be mixed with equal quantity of Fehling solution and boiling for **10 -15 minute** to produce the **reddish brown coloured precipitate** due to formation of **Cuprous oxide**

C- Osazone formation test: test was developed to identify **aldose sugars** to recognize the alpha-carbon. These sugars react with **2, 4-dinitro-phenyl hydrazine and sodium acetate and acetic acid** effecting only alpha-carbon sugar with formation of **pink-red coloured bis-phenylhydrazone**, known as an osazone.

D- resorcinol test : This test is used for identification of keto-hexoses or to distinguish between ketoses and aldoses. To 1 ml aqueous solution of solution , 5 ml of resorcinol reagent (resorcinol in 6M HCl) was added and boiled. Formation of **cherry red colour** in presence of ketose (Fructose) due to formation of **hydroxyl methyl furfural**.

A- **Charring test:** Carbohydrates on heating in test tube or in presence of Conc. H_2SO_4 , produces charring **تفحم** with smell like burning sugar.

B- **Iodine test:** It is specific for polysaccharides. Few drops of Iodine solution was added to aqueous solution of polysaccharide. Formation of blue colour, **which disappears on heating and reappears on cooling**, indicates the presence of **starch**.

C- **Barford test:** This test is used to distinguish between monosaccharide and disaccharides. 2 ml of Barford reagent (**Cupric acetate, acetic acid and water**) was added to 1 ml aqueous solution of drug and boil. Formation of brick red precipitate **يشبه لون الطوب الاحمر** in 5 minutes indicates presence of monosaccharide while in 7 minutes indicates disaccharide.

Chemical test for Starch:

a- **Jelly test:** To 0.5 gm of starch in a test tube add 5 ml of **distilled water and boil on water bath**. Formation of translucent **شفاف** jelly indicates presence of starch.

b- **iodine test:** It is also known as iodine – KI reagent and composed of aqueous **Iodine solution** in presence of KI. Few drops of iodine – KI reagent was added to the aqueous solution of starch, which produces deep **blue to bluish black colour** due to presence of amylase. The colour developed **disappears on warming and reappears on cooling**. Starch amylopectin, disaccharides and cellulose do not produce any colour.

Gums and mucilage's:

They have similar constitutions and on hydrolysis yield a mixture of sugars and uronic acids (sugar **acids** with carboxylic **acid** functional groups).

Gums are considered to be pathological products formed upon injury of the plant or owing to unfavorable conditions, such as drought **جفاف**, by a breakdown of cell walls (extracellular formation).

mucilages are generally normal products of metabolism formed within the cell (intracellular formation) and may represent storage material to protect the germination seeds . They are often found in quantity in the cells of leaves, e.g. senna, in seed coats (linseed , psyllium etc.), roots (marshmallow) and bark (slippery elm).

Tragacanth

It is the air-hardened gummy exudate, flowing naturally or obtained by incision, from the trunk and branches of *Astragalus gummifer* and *Astragalus brachycalyx*. The genus (Leguminosae) contains some 2000 species and those that yield gum are thorny shrubs .

Formation. the gum exuding immediately after injury and performed in the plant and are gradually transformed into gum.

Collection. The mode of collection varies, but the following steps of collection :Gum can be obtained from the plants in their second year. The part of plant is incised . then open the incision so that the gum will exude more freely. The gum exudes is collected 2 days after the incision.

Characters. The gum is **white or very pale yellowish-white in colour**, translucent . It breaks with a short fracture, is **odorless** and has little taste. Tragacanth swells into a gelatinous mass when placed in water, but only a small portion dissolves.

On the addition of a dilute solution of **iodine** to a fragment previously soaked in water, relatively few **blue points** are visible

Constituents. Tragacanth consists of a **water-soluble** fraction known as **tragacanthin** and a *water-insoluble fraction known as bassorin*. Both are insoluble in alcohol. Tragacanthin and bassorin may be separated by ordinary filtration a dilute mucilage and the tragacanthin may be

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estimated by the evaporation of the filtrate. tragacanth is composed of sugar and uronic acid units. Among the products of hydrolysis galacturonic acid, d-galactopyranose, l-arabinofuranose and d-xylopyranose have been identified.

Uses. Tragacanth is used in pharmacy as a suspending agent for insoluble powders, etc., or as a binding agent in pills and tablets. It is used as a topical treatment for burns. It is used in pharmaceuticals and as an emulsifier, thickener, stabilizer,